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ATTORNEYS AT LAW

Docket No.: 211758US0

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

RE: Application Serial No.: 09/909,898
Applicants: Yoshio SUGAYA, et al.
Filing Date: July 23, 2001
For: ANION EXCHANGE MEMBRANE, PROCESS FOR ITS PRODUCTION AND SOLUTION TREATING APPARATUS
Group Art Unit: 1713
Examiner: Zitomer

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SIR:

Attached hereto for filing are the following papers:

Reply Brief--3X; Request for Oral Hearing

Our check in the amount of **$290.00** is attached covering any required fees. In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, including any fees required under 37 C.F.R 1.136 for any necessary Extension of Time to make the filing of the attached documents timely, please charge or credit the difference to our Deposit Account No. 15-0030. Further, if these papers are not considered timely filed, then a petition is hereby made under 37 C.F.R. 1.136 for the necessary extension of time. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Yoshio SUGAYA, et al.

SERIAL NO: 09/909,898 GAU: 1713

FILED: July 23, 2001 EXAMINER: Zitomer

FOR: ANION EXCHANGE MEMBRANE, PROCESS FOR ITS PRODUCTION AND SOLUTION TREATING APPARATUS

REQUEST FOR ORAL HEARING

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Applicant's representative hereby respectfully requests that an Oral Hearing be scheduled in the above-identified application.

A check in the amount of **$290.00** to cover the fee is enclosed herewith and any further charges may be made against the Attorney of Record's Deposit Account No. **15-0030**. A duplicate copy of this sheet is enclosed.

Respectfully Submitted,

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YOSHIO SUGAYA, ET AL.	: EXAMINER: ZITOMER, F.
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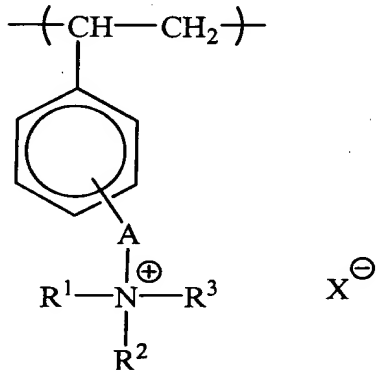
REPLY BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Responsive to the Examiner's Answer of August 28, 2003, please consider the following:

The invention, as defined by Claim 1, relates to an anionic exchange membrane comprising a resin phase which contains from 20 to 96 mass% of a polymer having repeating units represented by the following formula (1):



. . . (1)

wherein A is a *C_{3-8} alkylene* group or an alkyleneoxyalkyl group having a total carbon number of from 4 to 9, each of R^1, R^2 and R^3 is a hydrogen atom, a C_{1-6} alkyl group or a hydroxyalkyl group, and X^- is an anion, and wherein any hydrogen atom bonded to the benzene ring may be substituted by an alkyl group or a halogen atom, and from 4 to 80 mass% of a thermoplastic polymer having no ion exchange groups, *mixed substantially uniformly.*

As so specifically recited in Claim 1, the defined anion exchange resin and the thermoplastic polymer are "mixed substantially uniformly" in the membrane. This means, as so defined at page 5, lines 7-14 of the specification, that when the resin phase is observed by an optical microscope, the polymer of the formula (1) and the thermoplastic polymer having no ion exchange groups can not be distinguished, and phase separated structure containing phases having a size of more than 1 μm can not be observed.

The Examiner, although acknowledging that the claims are interpreted in light of the specification, nevertheless, asserts that the claimed limitation "mixed substantially uniformly" is indefinite and thus not being limiting. It is submitted that the Examiner's reasoning for asserting the quoted limitation to be non-limiting is not sustainable. While parameters of, for instance, magnification, type of light, staging, etc. are not set forth, the further limiting language that in the structure phases having a size of more than 1 μm cannot be observed clearly is not a contradiction in terms, as so asserted by the Examiner but, rather, more particularly defines the nature and character of the mixed phase by reciting that when observed by an optical microscope, whatever conditions are employed, phase separated structures containing phases having a size of more than 1 μm cannot be observed.

Such is achieved only by using the claimed process for its preparation, i.e., wherein a thermoplastic polymer having no ion exchange groups is mixed with a polymerizable

component comprising a monomer of the formula (2), as defined in Claim 5, and the polymerizable monomer is then polymerized while mixed with such thermoplastic polymer, i.e., grafting of the polymerizable component onto the thermoplastic polymer can be presumed to take place. Such process is not disclosed by Terada et al. nor by McDonald.

Thus, even by combining McDonald with the other references, McDonald not being relied upon in the rejection of the product claims, Applicants' discovery is not made obvious thereby. Applicants, contrary to the assertion by the Examiner, do not attack the references individually but, contrariwise, submit that even by combining the teachings of the references, Applicants' discovery is not made obvious thereby. Even if Terada et al. and Tomoi et al. are combined, no defined mixture being "mixed substantially uniformly" is disclosed, taught or made obvious by the combination of these references.

Moreover, Terada discloses a porous ion exchanger disposed in a demineralizing compartment of an electrodializer; this reference does not relate to an ion exchange membrane.

Further, it is again submitted that the closest prior art has been compared with and shown to result in a product of superior properties and characteristics. Note Comparative Example 3 at page 20 of the specification. Thus, Tomoi et al. manifestly is not the closest prior art, it only disclosing the anion exchange resin, *per se*, not as a mixture with a binder polymer. Example 3 clearly shows the significance and materiality of the anion exchange resin being as claimed, rather than in Terada et al, and being mixed substantially uniformly with a thermoplastic polymer having no ion exchange groups, demonstrating unobvious results being obtained thereby, even if prepared so as to obtain a mixture "mixed substantially uniformly", as defined. Such, contrary to the Examiner's assertion, clearly rebuts any conceivable *prima facie* case of obviousness made out by the art.

Also, when comparing Example 1 (present invention) and Example 3 (Comparative Example), Example 1 employs an alkylene group having a carbon number of 4 as A of the formula (1) or (2), whereas Example 3 employs an alkylene group having a carbon number of 1 as of the formula (1) or (2), the number of carbon atoms being the difference between these examples.

The evaluation results of the ion exchange membranes thus obtained in the two Examples are summarized below on the basis of the descriptions in the present specification.

	Example 1 (present invention)		Example 3 (Comparative Example)	
	Before durability test	After immersing in deionized water at 80°C for 6 months	Before durability test	After immersing in deionized water at 80°C for 6 months
Ion exchange capacity (meq/g dry resin)	1.8	1.76	1.9	1.5
Resistivity (Ω·cm)	600	630	500	1000
Static transport number	0.97	0.97	0.97	0.92

As is evident from the above evaluation results, the ion exchange membrane of Example 1 of the present invention shows substantially the same performances before and after the durability test, while the ion exchange membrane of Example 3 (Comparative Example) is remarkably degraded with respect of its performances before and after the durability test.

Thus, the above evaluation results show that even if a polymer containing a repeating unit expressed by the formula (1) is known to have excellent heat resistance, it would not be obvious to one skilled in the art that an ion exchange membrane containing this polymer would show satisfactory heat stability without damaging other performances under practically used environments.

Accordingly, for reasons as set forth in the Appeal Brief, supplemented by the arguments made herein, reversal of the Examiner's rejection of the claims is again solicited.

Respectfully submitted,

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